

RADIATION PROTECTION STRATEGY OF RODENTS POPULATIONS IN RADIOCONTAMINATED ENVIRONMENT (KYSHTYM ACCIDENT, RUSSIA)

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This research reports the new materials on radioadaptation of small mammals inhabiting the East Urals Radioactive Trace (EURT) zone has appeared in the result of Kyshtym Accident (1957), which took place in the Southern Urals, Russia. Small rodents populations are submitted by individuals of two different types of ontogenetic development, distinguished by intensity of metabolism, life span, number of ecophysiological traits and age markers. The main criterion for definition of the ontogeny pathway is a functional status of specimen. Mature young of the year (the first type of ontogeny) are individuals with high level of metabolism, function - to increase population abundance by breeding in the year of birth. Immature young of the year (the second type of ontogeny) - low level of metabolism, function is to preserve of the population until the next spring with the smallest losses. It was shown (10 years of monitoring) the abundance of rodents in the EURT zone (density of soil pollution of ^{90}Sr - 451 Ci/km²) is steady higher than on background areas. It is directly connected with reproductive characteristics of animals: their actual fecundity is higher, whereas embryonic mortality and the proportion of females with embryonic losses are significantly lower. Individuals with the first type of ontogeny - the mature children of overwintered animals, which form the second generation, dominate in the impact population. The overwintered animals are representatives of all generations born in the previous year and their proportions being variable. This provides the possibility of transgeneration transmission of genetic information. The main question is how the specificity of two alternative types of ontogeny could be protecting a population in the radiocontaminated environment? It was found more higher (twice) intensity of ^{90}Sr accumulation in bone tissue of immature young of the year (second type) as compared to mature young of the year (first type), i.e. the speed of ^{90}Sr deposition is determined by the functional status of animals. Thus, the stability of a population, as a homeostatic system, is reached due to intensification of metabolism and population reproduction i.e. increase of proportion of individuals of the first type of ontogeny. Accumulation of osteotropic radionuclides, hence, exposure to chronic irradiation influence refracts through functional structure of a population (through specificity of two alternative types of ontogenetic development). Population of rodent in the EURT zone is compelled to include more energy-intensive way of maintenance its ability to live - the first pathway of ontogeny. Thus the preconditions for acceleration of evolutionary transformations of a population are created, but this process is often restrained by both the local configuration of the polluted territories and migration of murine rodents. As a consequence, the population decreases the probability

that certain changes will be fixed and inherited in a series of generations. Thus, chronic low-dose irradiation can be considered as the mechanism of switching of life history of cyclomorphic mammals. Ontogenetic multiversality of small mammals as an important mechanism of radioadaptation at the population level and decreasing the damaging action of biota in radiocontaminated environment is discussed.